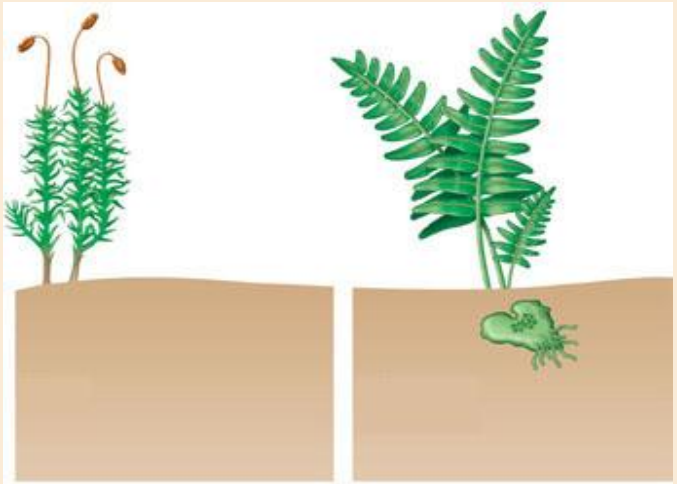
Plant Diversity II
Angiosperms



Plant Diversity II
Plant Kingdom; an overview

Bryophytes

Gametophyte dominant; sporophyte dependent; gametophyte independent

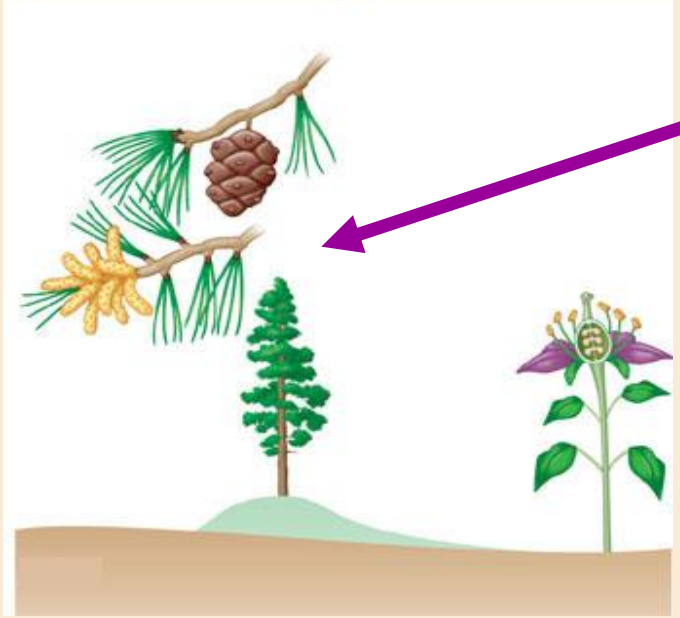


Seedless vascular plants

Sporophyte dominant; sporophyte initially dependent; gametophyte independent

Seed plants

Sporophyte dominant; sporophyte independent; gametophyte dependent & microscopic



Gymnosperms

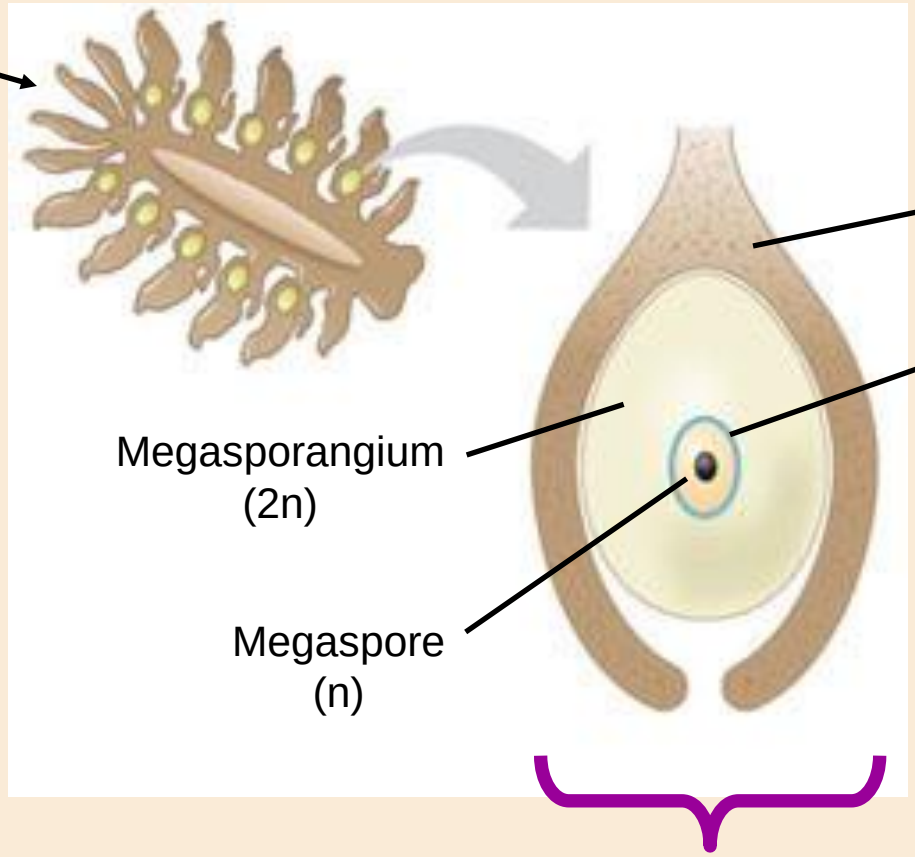
Gametophytes develop inside cones

Angiosperms

Gametophytes develop inside flowers

Layers of integuments envelope and protect the megasporangium

In this example we are using a pine cone

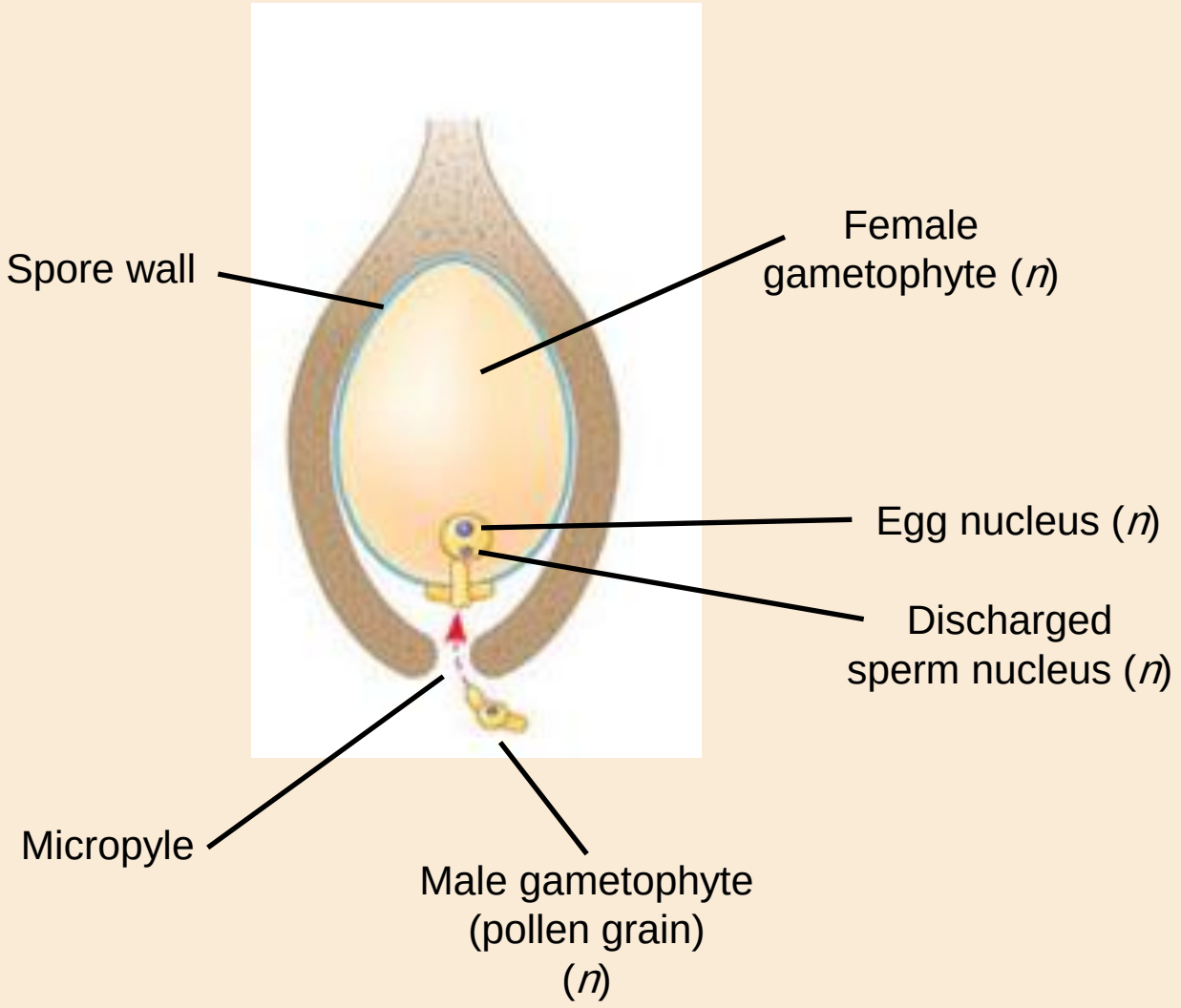


A megaspore develops into a multicellular female gametophyte

The whole structure – megasporangium, megaspore, and integuments – is called an ovule

Fertilization initiates the transformation of the ovule into a seed

A megaspore develops into a multicellular female gametophyte



Fertilization initiates the transformation of the ovule into a seed

Compared to a single-celled spore, a seed is much more resistant and complex



Angiosperms

Flowering plants; seeds develop inside sporophyte ovaries











Angiosperms

Flowering plants;
seeds develop inside
sporophyte ovaries

~250,000 extant species

BASAL ANGIOSPERMS



Amborella trichopoda

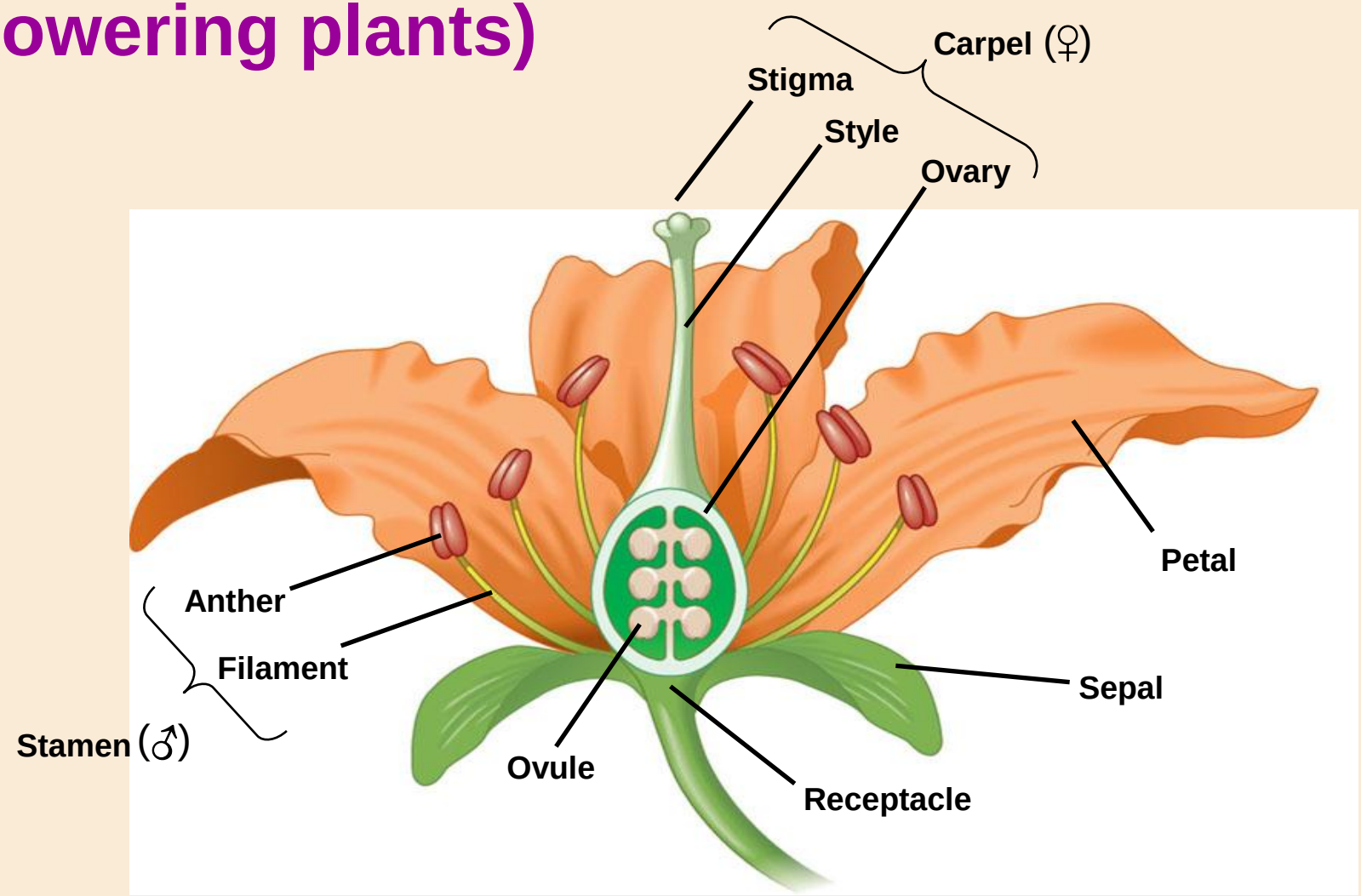


Water lily



Star anise

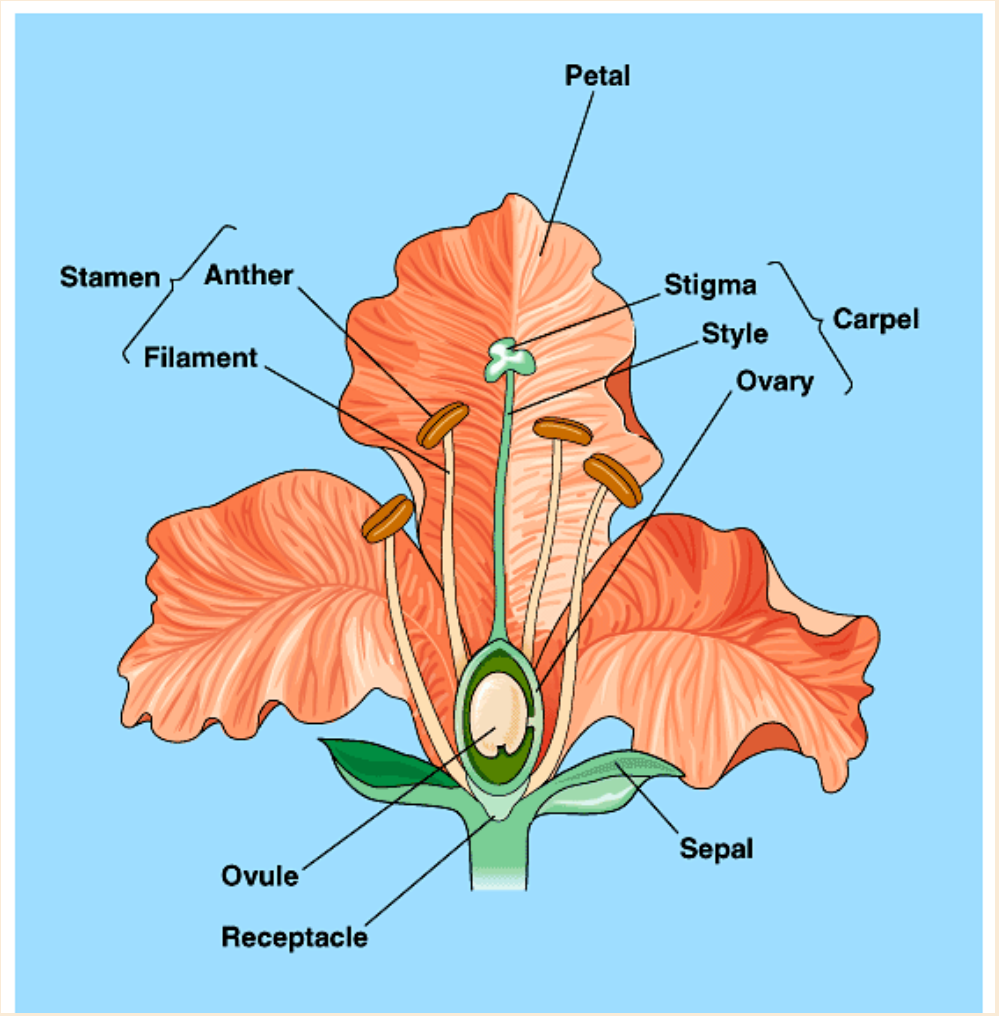
Angiosperms (flowering plants)



Angiosperms

Complete flowers have **sepals**, petals, stamens & carpels

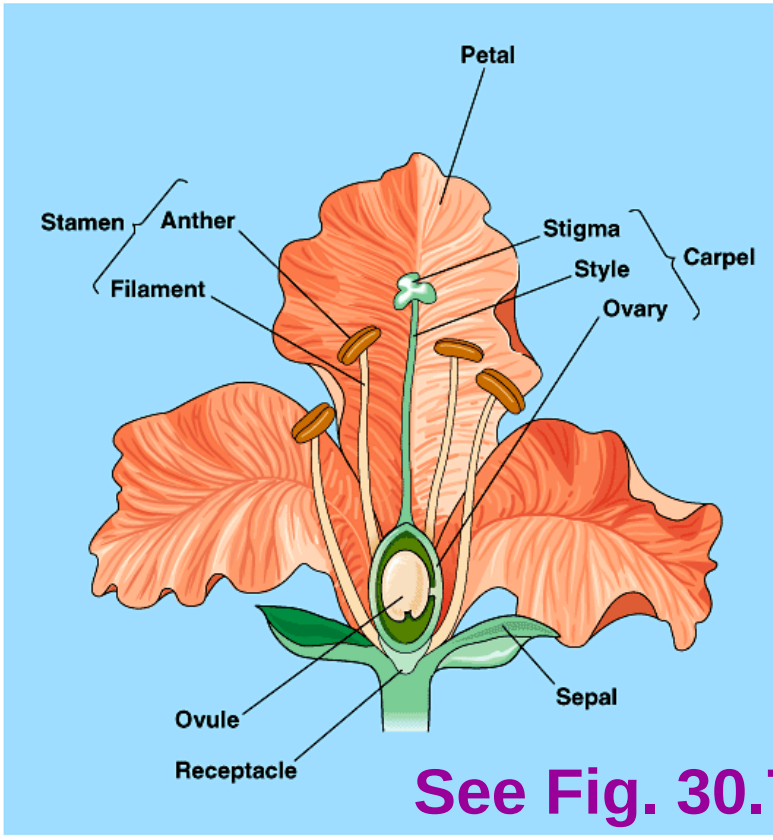




Angiosperms

Complete flowers have sepals, **petals**, stamens & carpels



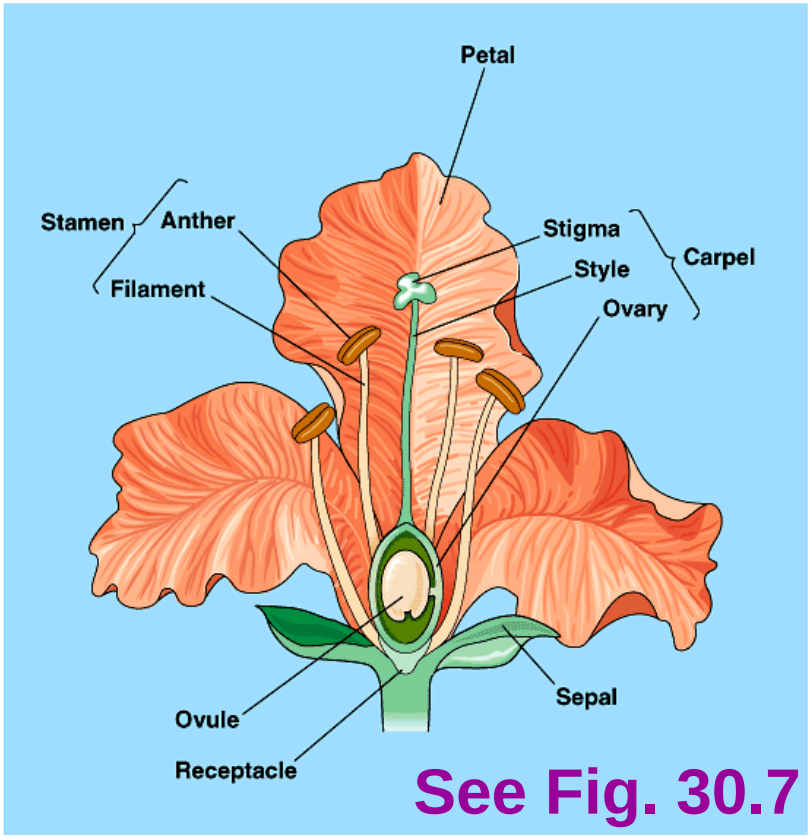


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Angiosperms

Complete flowers have sepals, petals, **stamens** & carpels

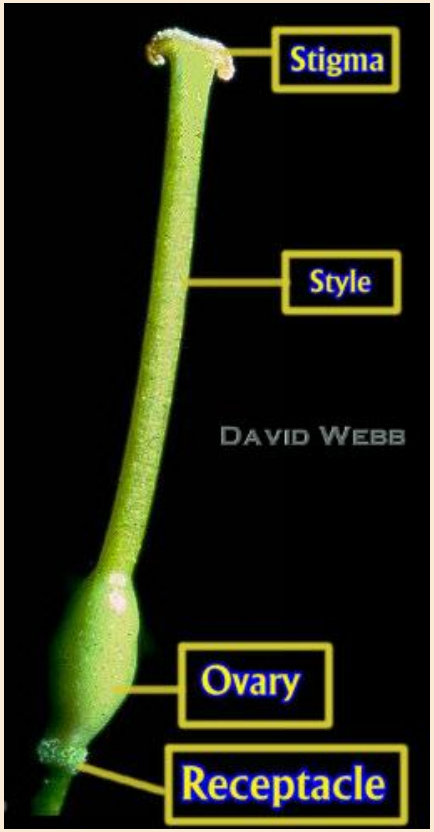


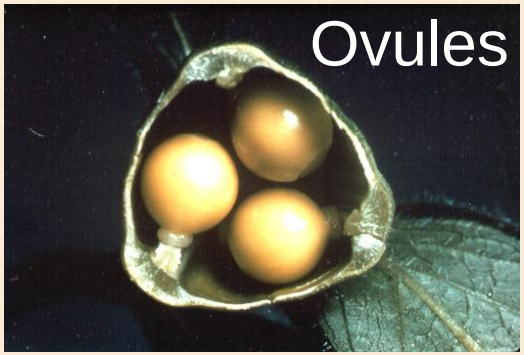


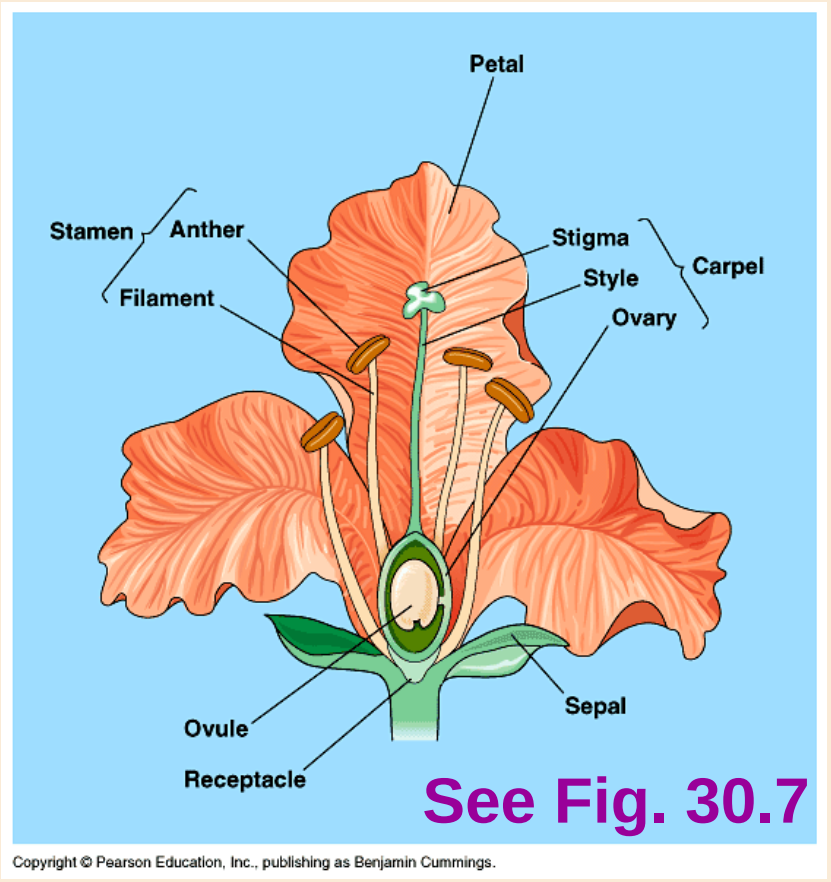
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Angiosperms

Complete flowers have sepals, petals, stamens & **carpels**





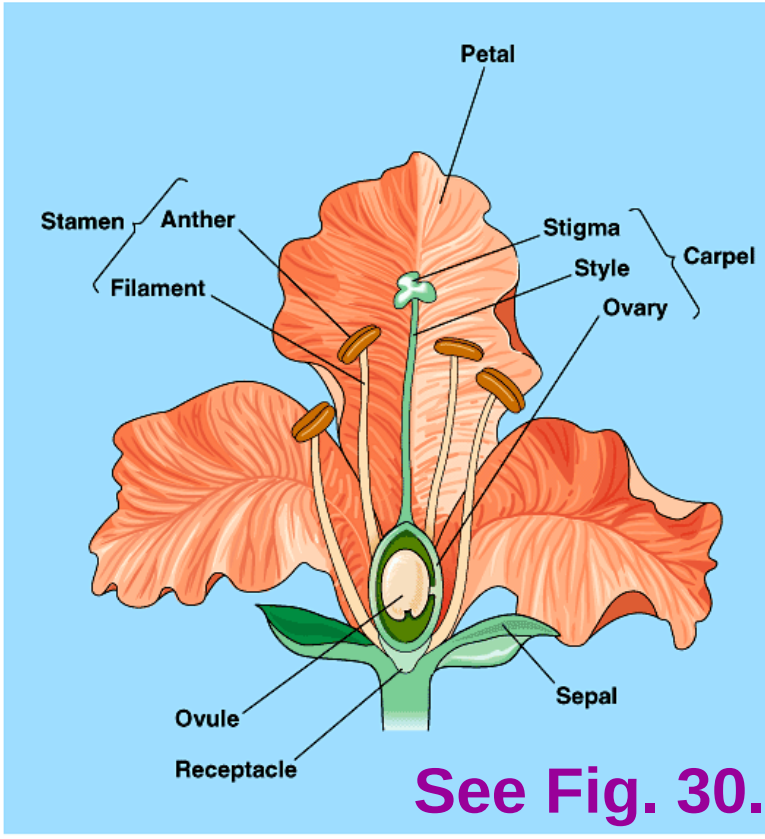


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Angiosperms

Complete flowers have sepals, petals, stamens & carpels

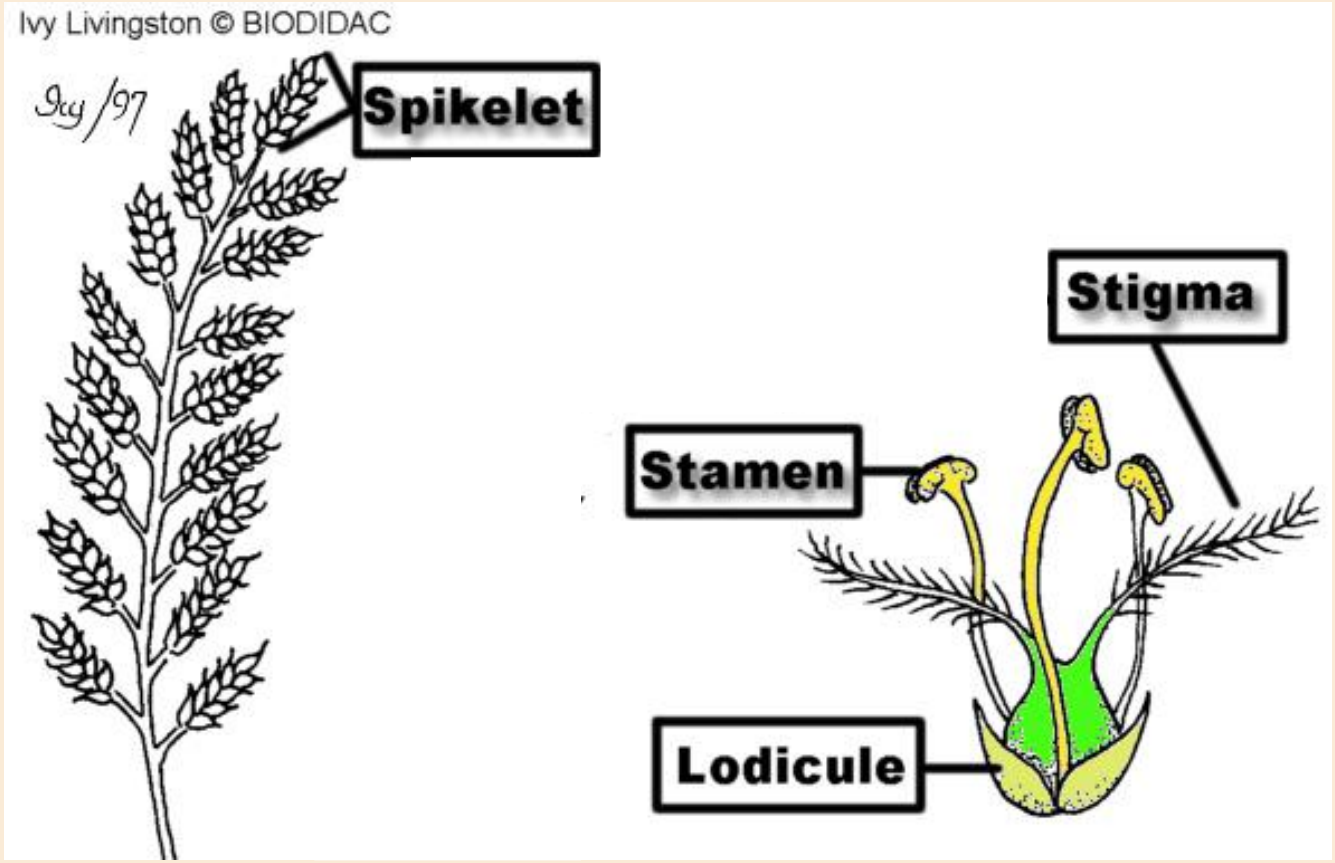
Bisexual flowers have both male (stamens) and female (carpels) reproductive structures; so complete flowers are also bisexual



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Angiosperms

Incomplete flowers lack one or more of the following: sepals, petals, stamens or carpels

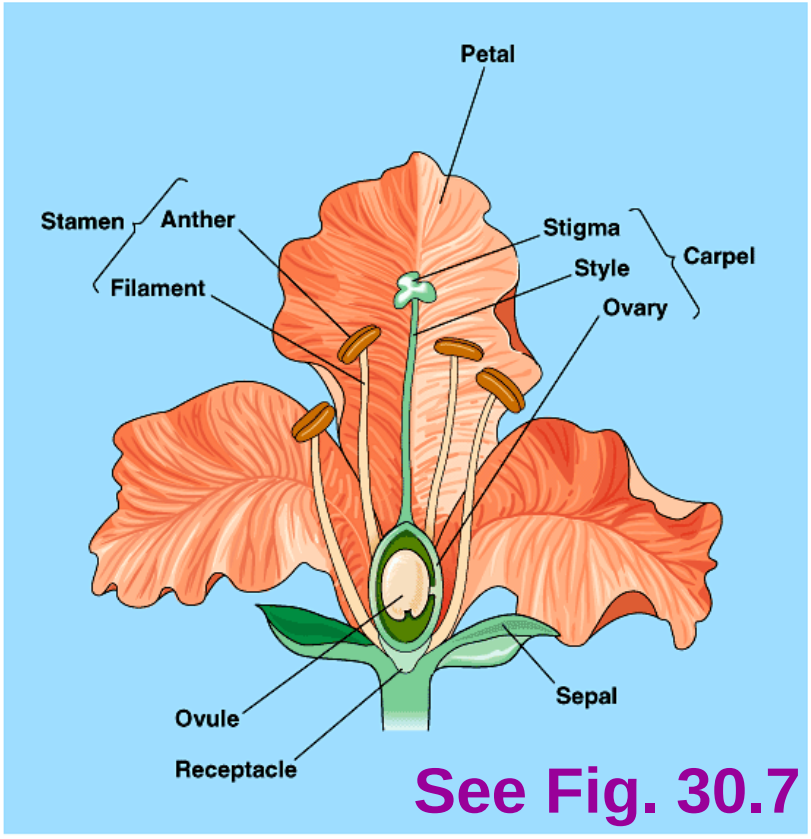


E.g., most grasses lack petals

Angiosperms

Self-fertilization

Some bisexual flowers can self-fertilize

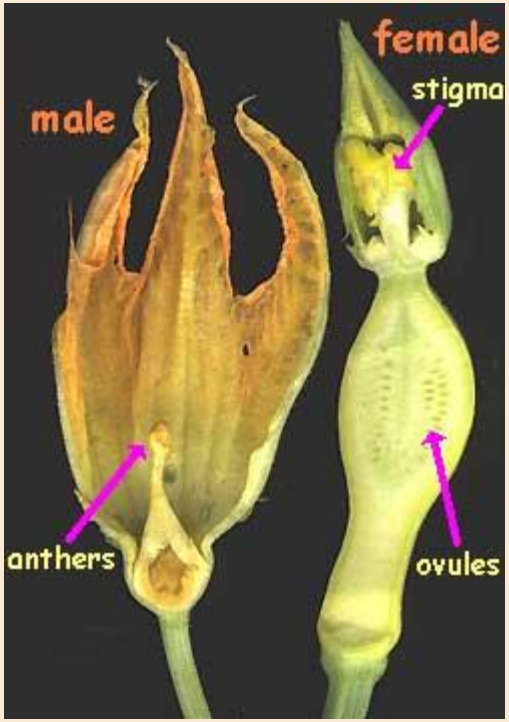


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Angiosperms

Monoecious individuals have separate male and female unisexual flowers on the same plant; which helps reduce self-fertilization, but does not eliminate it

Incomplete, staminate flowers lack carpels



Incomplete, carpellate flowers lack stamens

E.g., squash

Angiosperms

Dioecious species have separate male and female individuals; which eliminates the possibility of self-fertilization



Staminate flowers

Carpellate flowers

E.g., branches from two holly plants

Angiosperms

Monocots	Dicots
	
 1 cotyledon	 2 cotyledons
	 Parallel veins
	 Netlike veins
	
 Scattered vascular tissue	 Ring of v. tissue
	
 Fibrous roots	 Tap root
	
 1 opening in pollen	 3 openings in pollen
	
 Floral organs in 3s	 Floral organs in 4s or 5s

Angiosperms

Anthers contain microsporangia that produce microspores

Each microspore forms a pollen grain (a male gametophyte)

Ovules contain megasporangia that produce megaspores

Each megaspore forms an embryo sac (a female gametophyte)

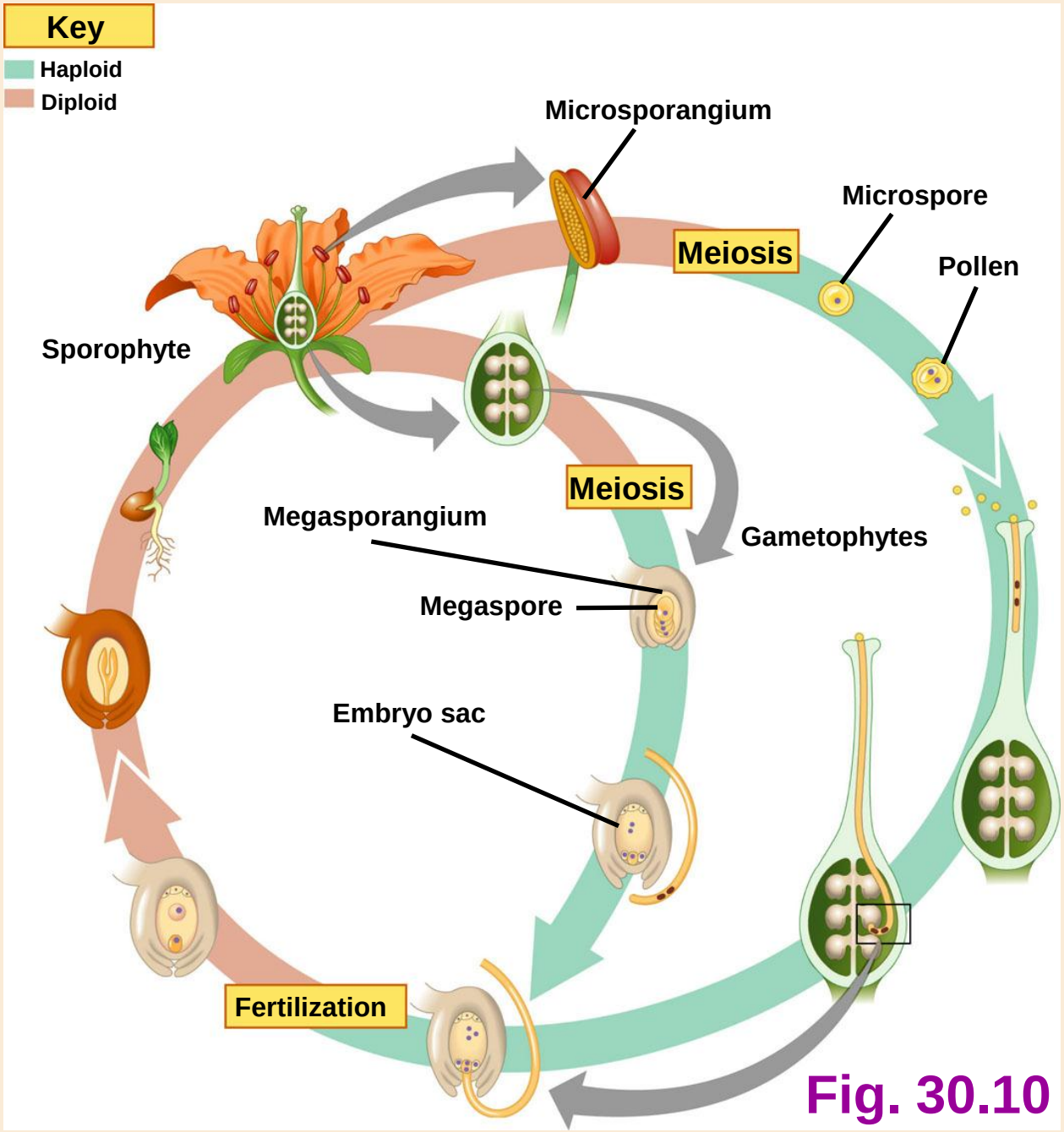


Fig. 30.10

Angiosperms

Pollen disperses to stigmas

Double fertilization is unique to angiosperms

Sperm enter an ovule through a micropyle

From a single pollen grain, one sperm unites with the egg to produce a zygote; the second sperm unites with 2 nuclei of the embryo sac to produce triploid (3n) endosperm

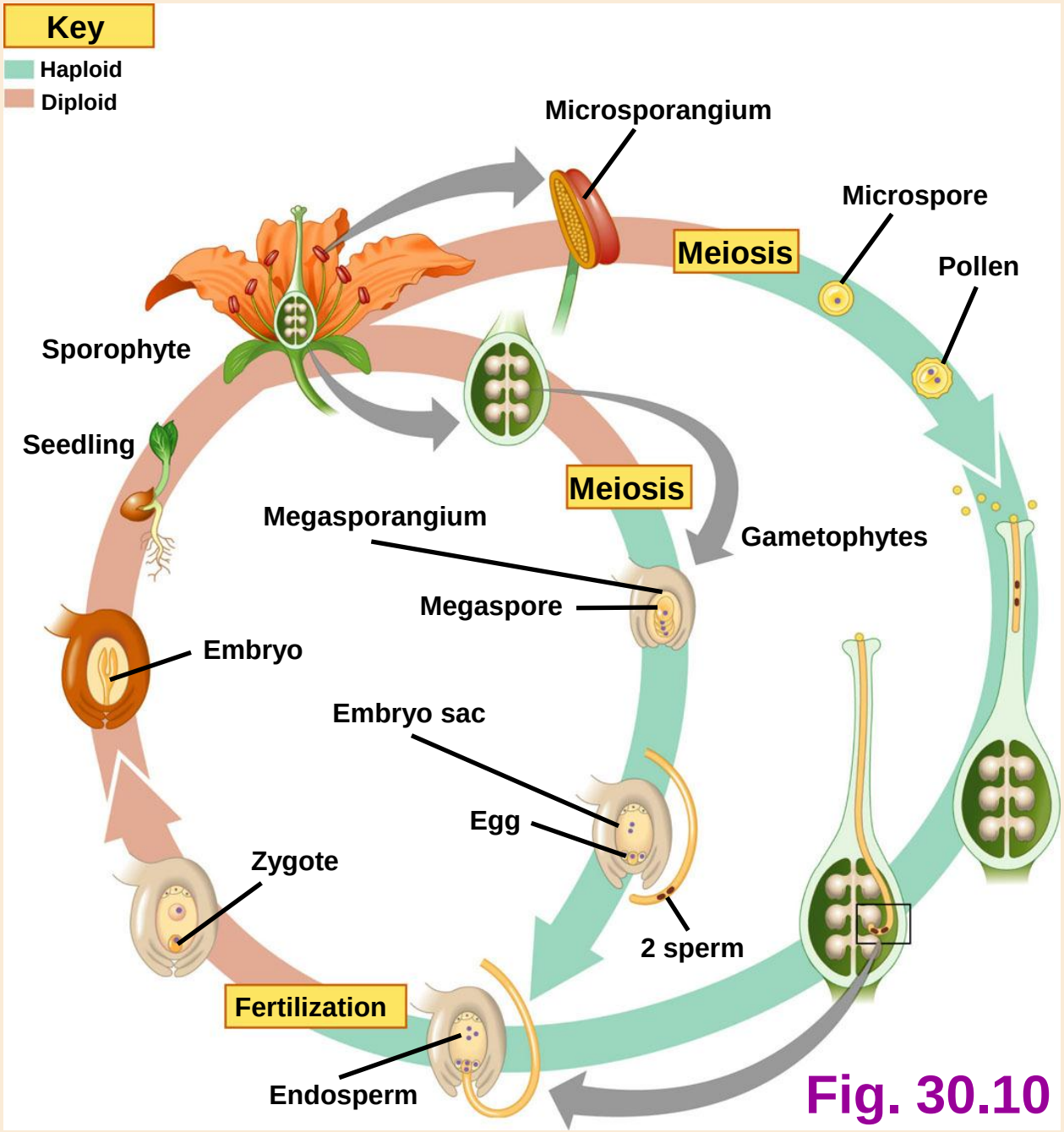


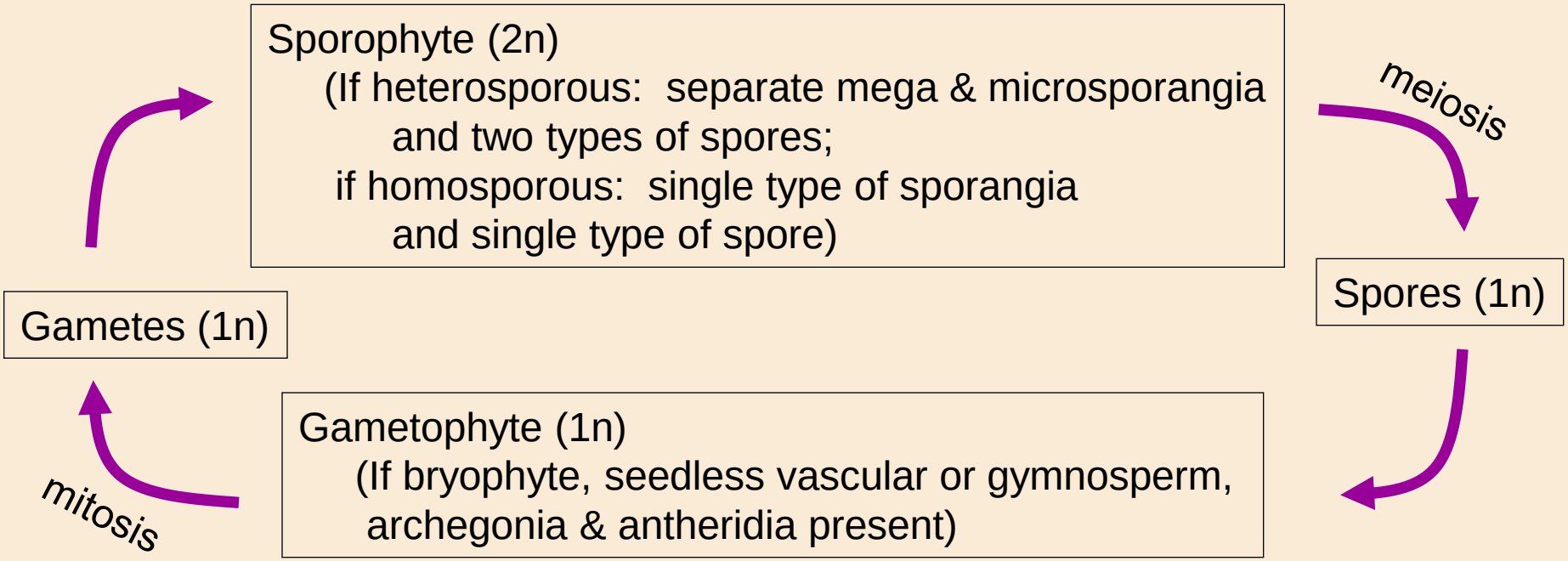
Fig. 30.10

Some key points to remember:

All spores and gametes are haploid

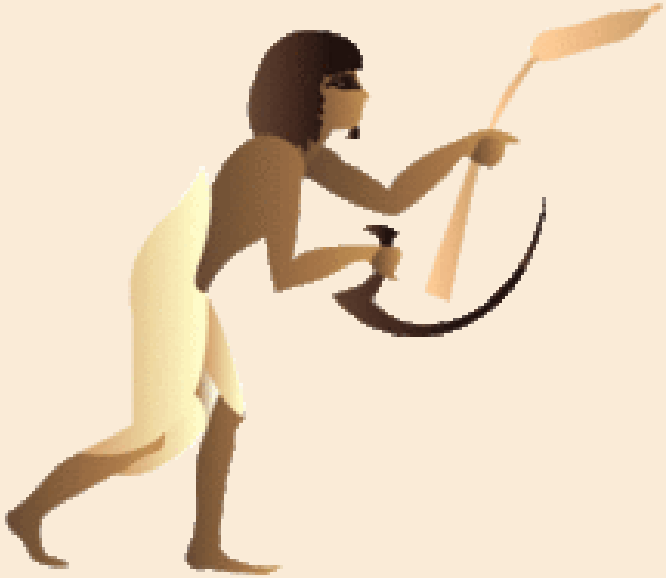
Sporophytes are diploid, and produce spores

Gametophytes are haploid, and produce gametes



Seed plants and human welfare

Humans began practicing agriculture only about 18,000 years ago





Multiple independent origins

Seed plants and human welfare

Even so, most of our food currently comes from angiosperms

Just 6 crops – wheat, rice, maize (corn), potatoes, cassava (manioc), sweet potatoes – yield 80% of all the calories consumed by humans







